Center Innovation Fund: ARC CIF

Raman Life Detection Instrument Development for Icy Worlds

Completed Technology Project (2016 - 2017)

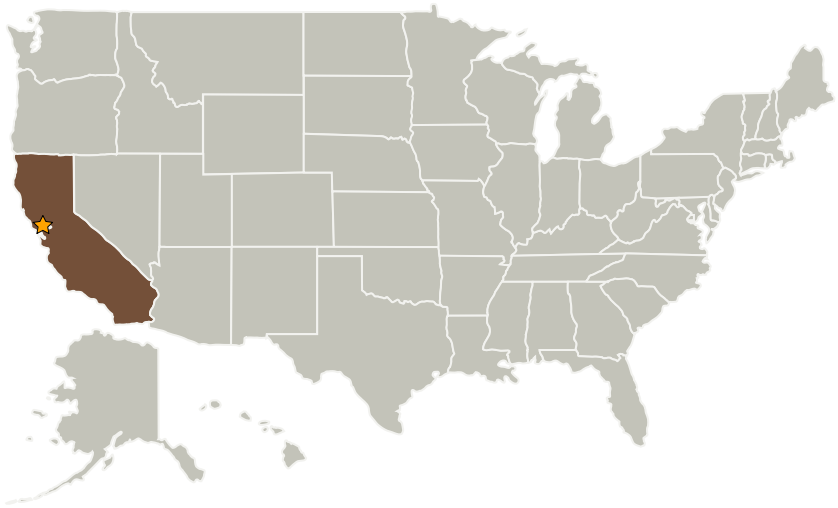
Project Introduction

We propose to develop the 1064 nm fiber laser Raman instrument capability to non-destructively analyze individual, micron-size particles in suspension of flow channel. In addition to obtaining Raman spectral information, physical manipulation (e.g. particle sorting) with the laser tweezers is possible with the single laser source. Raman spectral analysis obtained on the optically trap the particles in a flow channel greatly minimizes instrumentation complexity. We choose cyanobacteria as a model life organism for Icy World mission. The fiber Raman instrument will measure its molecular marker hopanoids and mimic an integration with the ARC SPLice

Anticipated Benefits

Liquid water is a necessary component of life as we know it. Within our solar system, two bodies are known to have liquid oceans, Europa and Enceladus. The prospect of finding evidence of extant life in these oceans is especially interesting to NASA, the scientific community and general public. Developments in life detection instrumentation is needed to fulfill future planetary exploration mission. Raman spectroscopy has been identified as a critical technique in astrobiology because it provides a high sensitivity for both organics and biosignatures in geological and water samples, with no requirement for sample preparation and minimal interference from water

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Center Innovation Fund: ARC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

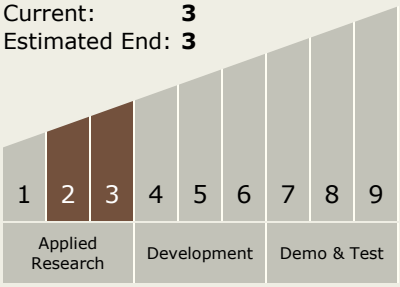
Harry Partridge

Principal Investigator:

Jessica E Koehne

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.2 Atomic and Molecular Species Assessment

Target Destinations

Mars, Others Inside the Solar System